

ENGINEERING SERVICES, REGION X  
CODES & INTERPRETATIONS COMMITTEE  
REVIEW SUMMARY

**REFERENCE:** Kenneth E. Olson, Bemidji Area IHS, Memorandum dated April 4, 1997.

**ISSUE:** Request for clarification of horizontal exit and smoke/fire damper requirements on the first floor of an existing health care occupancy (NFPA 101, 13).

**LOCATION:** Cass Lake Indian Hospital, Hospital Building, Cass Lake, MN

**BACKGROUND:** The Hospital Building at the Cass Lake Indian Hospital is located in a one-story masonry bearing wall and steel frame building with a partial basement. The building is sprinklered except for the attic space between the existing plaster ceiling and the roof. Building construction is classified as Type II (000) because of the unprotected roof construction. The basement houses administrative and support functions, while all patient services are housed on the main floor. The building use is classified as Existing Health Care Occupancy. The floor-ceiling assembly between the basement and the first floor is 6 inches of terrazzo and concrete atop metal lath, 8-inch deep steel I-beams 20" o.c., and 1-inch thick suspended plaster ceiling 24-inches below the floor. In two rooms, 013 and 014, there is no plaster ceiling and the beams are fireproofed. Where the first floor is over crawl space, the floor beams are not fireproofed. The first floor walls are typically either 6-inch or 4-inch hollow clay block with 1-inch plaster on both sides except for newer walls which are 3-1/2-inch metal studs with 5/8-inch Type X gypsum wallboard on both sides. The roof-ceiling assembly is wood decking supported by 6-inch deep steel I-beams 20" o.c., 1-inch thick suspended plaster ceiling 24-inches below the floor, and a suspended ceiling assembly approximately 24-inches below the plaster ceiling. The integrity of the plaster ceiling is compromised by numerous large holes. The facility desires to convert what appear to be two existing smoke barriers into horizontal exits to eliminate the need to evacuate patients to the exterior in the event of a fire. These two smoke barriers are within Inpatient Corridor 408 and are defined by the following walls:

On the west side of Inpatient Corridor 408: starting with the east, south and west walls of Stairwell 417, the west wall of Inpatient Corridor 408, the west and south walls of Toilet 414, and part of the west wall of Inpatient Room 413;

On the east side of Inpatient Corridor 408: starting with the angled south wall of Laboratory Alcove 305 to and including the east wall and south wall of Copy Room 300D, the east wall of Nursing Station 403, part of the north wall, the east wall and part of the south wall of Corridor 408 to and including the west wall of Clean Supply 401.

The Cass Lake Indian Hospital after completion of the current renovation project will serve 11 inpatients. The first floor of the Cass Lake Indian Hospital is currently 15,121 square feet excluding the radiology addition which is separated from the main hospital building. Currently, five exits discharge directly to the exterior. An additional exit discharges through the access corridor to the radiology addition. There is also an exit to the north at the end of Corridor 310 which currently does not qualify as an exit because of its clear width, creating a

dead end in excess of the 50 foot maximum. A subsequent project currently in advertisement will correct this deficiency.

**DISCUSSION:** NFPA 101, LSC, 13-3.7 requires subdivision of a building story into two smoke compartments when the story serves more than 30 patients. Further, the maximum size of any smoke compartment shall not exceed 22,500 square feet.

The minimum requirements for smoke barriers are:

- 1/2 hour fire resistive construction, constructed continuously from outside wall to outside wall through concealed spaces;
- doors must be a minimum 20-minute fire protection rating or be of 1-3/4-inch thick solid bonded wood core construction;
- openings shall be protected by fixed, wired glass panels set in metal frames, or other fire-rated glazing, maximum size 1,296 square inches;
- doors shall be self-closing or automatic-closing, swinging or horizontal sliding with a minimum clear width of 32-inches; and
- at least 30 net square feet per patient is required on each side of the smoke barrier.

NFPA 101, LSC, 13-2.2.5 allows horizontal exits as a means of egress from health care occupancies. Horizontal exits can provide up to two-thirds of the total egress capacity provided no fire area shall be served only by horizontal exits.

The minimum requirements for horizontal exits are:

- 2 hour fire resistive construction, constructed continuously from outside wall to outside wall through concealed spaces, and continuous to the ground;
- doors must be a minimum 1-1/2 hour fire protection rating;
- doors shall be self-closing or automatic-closing;
- doors shall be designed and installed to minimize air leakage;
- duct penetrations are not allowed unless protected by approved and listed dampers and the building is fully sprinklered; and
- at least 30 net square feet per patient is required on each side of the fire barrier.

Separation need not be continuous to the the ground, if:

- 2 hour fire resistive construction separates the floor with the horizontal exit from other floors without the fire barrier;
- 2 hour fire resistive construction separates all vertical openings between the floor with the horizontal exit from other floors without the fire barrier; and
- all other required exits discharge directly to the outside.

The existing hospital construction is assumed to meet the following equivalencies for fire resistive construction:

- 2 hour fire resistive construction in floor-ceiling assembly between basement and first floor;
- 1-1/2 to 2 hour fire resistive construction between crawl space and first floor;

2 hour fire resistive construction for 6-inch hollow clay block and plaster walls;

1 hour fire resistive construction for 4-inch hollow clay block and plaster walls, and metal stud and gypsum wallboard walls; and

0 hour fire resistive construction for roof-ceiling assembly.

INTERPRETATION: Subdivision of the building into smoke compartments or horizontal exits for exiting purposes are not required to meet the minimum requirements of NFPA 101, LSC. The facility size does not require separation into two smoke compartments; and sufficient exits exist without consideration of horizontal exits. Three deficiencies were noted in the current facility as part of this review:

The roof-ceiling assembly does not meet the minimum requirements to allow classification under Type II (111). The space between the plaster ceiling and the roof deck should be fully sprinklered.

The existing exterior door at the end of Corridor 310 does not meet the minimum clear width requirements for consideration as an exit. As a result, a dead end in excess of the 50 foot minimum is created. A project currently out for bid will correct this deficiency as noted previously.

The west, south and east walls of Stairwell 417 are identified in the current JCAHO Statement of Conditions as the separation between the health care occupancy on the first floor and the business occupancy in the basement. These walls and openings currently do not meet the minimum 2 hour fire resistive construction requirements necessary for an occupancy separation.

As noted above, your facility does not require horizontal exits. Should you wish to add horizontal exits for the convenience of creating areas of refuge, the following minimum requirements are necessary:

All walls of the horizontal exits must be upgraded to minimum 2 hour fire resistive construction. All walls appear to meet that requirement except for the south wall of Toilet 414 and the east and south walls of Room 300D.

The west, south and east walls and openings therein of Stairwell 417 must be upgraded to minimum 2 hour fire resistive construction.

All doors penetrating the 2 hour fire resistive construction noted above shall be minimum 1-1/2 hour fire protection rating, automatic closing, designed to minimize air leakage. Doors shall not have hardware or accessories applied that compromise the integrity of the fire protection rating. Only the door to Toilet 425 appears to currently meet these requirements.

Duct penetrations through the fire barriers shall have approved fire dampers

In response to the specific questions related to horizontal exits cited in your memorandum:

*Do ducts penetrating fire barriers need dampers?*

As a general rule ducts should not penetrate fire barriers forming part of a horizontal exit. However, the code does consider a fully sprinklered building an acceptable means to meet the intended level of safety and accordingly permit duct penetrations. Any duct penetration through the fire barrier still requires an approved fire damper. NFPA 101, 5-2.4.3.3, Exception No. 1 applies only to **existing duct penetrations** and only if approved by the authority having jurisdiction. Smoke barriers do not require smoke dampers in fully ducted heating, ventilating and air conditioning systems when the building is fully sprinklered.

*Are the doors at each end of corridor 408 suitable for horizontal exits?*

The existing doors do not meet the requirements for horizontal exits. See minimum requirements noted previously for doors in horizontal exits.

*Are the doors to corridors 310 and 416 suitable for horizontal exits?*

Corridors 310 and 416 are inappropriate for consideration as areas of refuge for inpatients. Corridor 310 is too narrow in width; and Corridor 416 is directly open to an unenclosed stair. The areas of refuge beyond the west and east ends of Corridor 408 more than adequately address the necessary capacity.

*What are the capacities of areas adjacent to horizontal exits? What posting is required or would you suggest?*

The area of refuge to the west of Corridor 408 (427, 428 & 432) is adequate for 27 patients. The area of refuge encompassing Corridor 408 (404, 408, 411, 412 & 413) is adequate for 43 patients. The area of refuge to the east of Corridor 408 (200, 201, 215 & 216) is adequate for 31 patients. Corridors 108, 204, and 300A, and Waiting Areas 300 and 209 are inappropriate as areas of refuge because of the narrow corridor access. No posting is required.

SIGNATURES:

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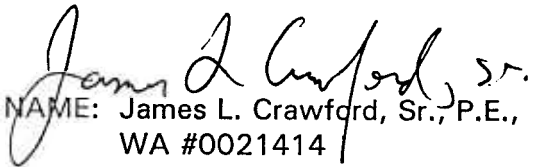
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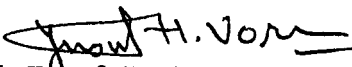
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